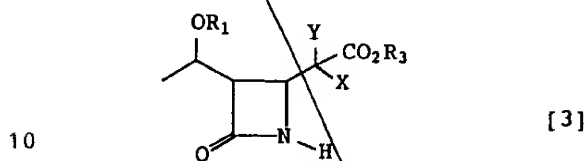


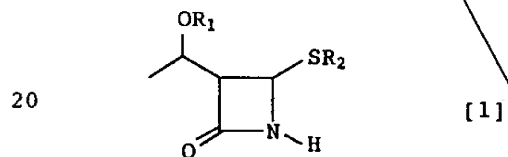
What is claim 1?
~~Claims~~

Claim 1.

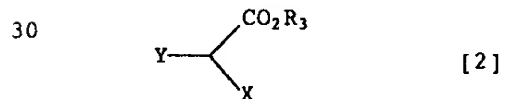
A process for synthesizing a 4-substituted azetidinone derivative represented by the general formula [3]:



(wherein OR₁, CO₂R₃, X and Y are as defined below), characterized in that said process comprises reacting an azetidinone derivative represented by the general formula [1]:



(wherein OR₁ is a protected hydroxyl group; R₂ is a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group or a substituted or unsubstituted aromatic group) with an ester compound represented by the general formula [2]:



(wherein CO₂R₃ is an esterified carboxyl group; X and Y are the same or different and represent individually a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted aralkyl group, a substituted or unsubstituted aryl group, a

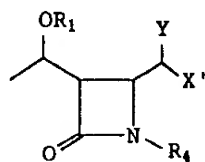
substituted or unsubstituted alkylthio group, a substituted
or unsubstituted alkenylthio group, a substituted or
unsubstituted aralkylthio group, a substituted or
unsubstituted arylthio group, a substituted or unsubstituted
5 alkyloxy group, a substituted or unsubstituted alkenyloxy
group, a substituted or unsubstituted aralkyloxy group, a
substituted or unsubstituted aryloxy group, a substituted or
unsubstituted silyloxy group, a substituted or unsubstituted
heterocyclic group, a substituted or unsubstituted
10 heterocyclic-thio group, a substituted or unsubstituted
heterocyclic-oxy group, a substituted or unsubstituted acyl
group, a substituted or unsubstituted ester group, a
substituted or unsubstituted thio ester group, a substituted
or unsubstituted amide group, a substituted or unsubstituted
15 amino group, a hydrogen atom or a halogen atom, or are taken
together with each other to form a substituted or
unsubstituted cycloalkan-2-on-1-yl group) in the presence of
zinc and copper compounds.

Claim 2.

20 A process for synthesizing a 4-substituted azetidinone
derivative represented by the general formula [3],
characterized in that said process comprises treating an
ester compound represented by the general formula [2] with a
metal base to convert to the corresponding metal enolate,
25 followed by reaction with an azetidinone derivative
represented by the general formula [1] in the presence of a
copper compound.

Claim 3.

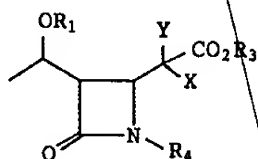
A process for synthesizing a 4-substituted azetidinone
30 derivative represented by the general formula [5]:



[5]

(wherein OR₁ and Y are as defined above, and R₄ is as defined
below; X' is the same as defined for X or a mercapto,

hydroxyl, formyl, carboxyl or thiocarboxyl group),
characterized in that said process comprises converting a 4-
substituted azetidinone derivative represented by the general
formula [4]:



[4]

(wherein OR₁, CO₂R₃, X and Y are as defined above; R₄ is a
hydrogen atom or a protective group or a substituent group
for amino group) to a carboxylic acid compound, followed by
decarboxylation treatment.

Claim 4.

A process as claimed in Claim 1 or 2, wherein the ester
compound represented by the general formula [2] is a
halogenated acetic acid ester, a malonic acid ester, an 2-
alkylmalonic acid ester, a 2-halogenated malonic acid ester,
an 2-alkyl-acylacetic acid ester or a cycloalkan-2-on-1-
carboxylic acid ester.

Claim 5.

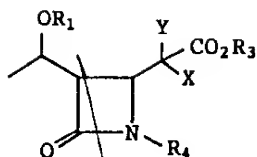
A process as claimed in Claim 1 or 2, wherein the ester
compound represented by the general formula [2] is a
bromoacetic acid ester, a malonic acid ester, a 2-
methylmalonic acid ester, a 2-fluoromalonic acid ester, a 2-
methylacetoacetic acid ester or a cyclohexan-2-on-1-
carboxylic acid ester.

Claim 6.

A process as claimed in Claim 1 or 2, wherein the copper
compound is a cuprous bromide dimethylsulfide complex.

Claim 7.

A 4-substituted azetidinone derivative represented by
the general formula [4]:



[4]

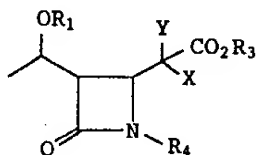
(wherein OR₁, CO₂R₃, R₄, X and Y are as defined above),
wherein the substituent at the 4-position is an esterified
carboxymethyl, di(esterified carboxy)methyl, 1-acyl-1-
esterified carboxyalkyl or 1-esterified carboxycycloalkan-2-
on-1-yl group.

Claim 8.

A 4-substituted azetidinone derivative as claimed in
Claim 7, wherein R₄ is a hydrogen atom or p-nitrobenzyloxy-
carbonylmethyl group.

Claim 9.

A 4-substituted azetidinone derivative represented by
the general formula [4]:



[4]

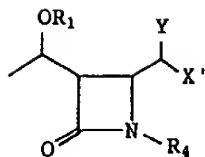
(wherein OR₁, CO₂R₃, R₄, X and Y are as defined above),
wherein the substituent at the 4-position is an alkoxy-
carbonylmethyl, di(alkoxycarbonyl)methyl, 1-acetyl-1-
alkoxycarbonylethyl, 1-acetyl-1-alkenyloxy-carbonylethyl, 1-
acetyl-1-alkoxyloxy-carbonylethyl or 1-alkenyloxy-carbonyl-
cyclohexan-2-on-1-yl group.

Claim 10.

A 4-substituted azetidinone derivative as claimed in
Claim 9, wherein R₄ is a hydrogen atom or p-nitrobenzyloxy-
carbonylmethyl group.

Claim 11.

A 4-substituted azetidinone derivative represented by
the general formula [5]:



[5]

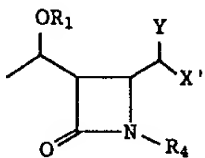
(wherein OR₁, R₄, X' and Y are as defined above), wherein the substituent at the 4-position is an esterified carboxymethyl, 1-acylalkyl or cycloalkan-2-on-1-yl group.

Claim 12.

- 5 A 4-substituted azetidinone derivative as claimed in Claim 11, wherein R₄ is a hydrogen atom or p-nitrobenzyl-oxy-carbonylmethyl group.

Claim 13.

- 10 A 4-substituted azetidinone derivative represented by the general formula [5]:



[5]

A

(wherein OR₁, R₄, X' and Y are as defined above), wherein the substituent at the 4-position is an alkoxycarbonylmethyl, 1-acetyethyl or cyclohexan-2-on-1-yl group.

Claim 14.

- 25 A 4-substituted azetidinone derivative as claimed in Claim 13, wherein R₄ is a hydrogen atom or a p-nitrobenzyl-oxy-carbonylmethyl group.

Add
A₂